

### CLAIMS

5 1. A process for the preparation of polydienes which comprises the polymerization of conjugated dienes in the presence of a catalytic system which essentially consists in components (a) to (d), wherein:

component (a): compound containing a rare-earth element  
10 having an atomic number from 57 to 71 in the Periodic Table, or a product obtained by reacting the above compound with a Lewis base;

component (b): an organo aluminum derivative containing at least one halogen atom;

15 component (c): an alumoxane;

component (d): an organometallic compound of aluminum represented by general formula (I)  $AlR_1R_2R_3$

wherein  $R_1$  and  $R_2$ , the same or different, are hydrocarbyl groups having from 1 to 10 Carbon atoms or hydrogen, and  $R_3$   
20 is a hydrocarbyl group having from 1 to 10 Carbon atoms;

the above process being characterized in that it is effected under operating conditions selected from:

(i) essentially isothermal conditions at a temperature ranging from 70°C to 140°C;

25 (ii) essentially adiabatic conditions with an initial tem-

perature ranging from 50°C to 90°C and a final temperature ranging from 100°C to 150°C;

the above process being continued under conditions (i) or (ii) until a polydiene is obtained, having branching index values (measured with the GPC-MALLS technique) lower than 0.90 and  $\alpha$  parameter values (also measured with the GPC-MALLS technique) ranging from 0.53 to 0.30.

2. The process according to claim 1, wherein the polymerization under isothermal conditions (i) is carried out at a temperature ranging from 80°C to 120°C.

3. The process according to claim 1, wherein the polydiene is selected from polybutadiene and polyisoprene.

4. The process according to claim 3, wherein the polybutadiene has a 1,2 content lower than 2%.

5. The process according to claim 1, wherein component (a) is a compound containing neodymium.

6. The process according to claim 1, wherein component (b) is an organo aluminum derivative containing at least one chlorine atom.

7. The process according to claim 1, wherein the molar ratio (a)/(b) ranges from 1/0.1 to 1/15, the molar ratio (a)/(c) ranges from 1/1 to 1/5,000, the molar ratio (a)/(d) ranges from 1/1 to 1/500, the molar ratio (c)/(d) ranges from 1/0.02 to 1/300.

8. The process according to claim 7, wherein the molar

ratio between component (a) and component (b) ranges from 1/0.5 to 1/5,

the molar ratio (a)/(c) ranges from 1/3 to 1/1,000,

the molar ratio (a)/(d) ranges from 1/10 to 1/300,

5 the molar ratio (c)/(d) ranges from 1/0.05 to 1/250.

9. The process according to claim 1, wherein component (a) is used in a quantity ranging from 0.0001 to 1.0 mmoles per 100 grams of conjugated diene to be polymerized.

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